

# OVERVIEW ABOUT THE COMPARISON MEASUREMENTS OF THE AUTOMATIC CONTINUOUS SAMPLER “DIOXINMONITORINGSYSTEM” TO VARIOUS MANUAL SAMPLING METHODS



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## Introduction

The device for continuous sampling of PCDD/PCDF emissions and other POPs, known as the DioxinMonitoringSystem®, is in operation now for more than 13 years and at about 60 installations. Since the first installation, several different organizations, including the manufacturer, but also local authorities and regional institutes decided to compare the results obtained using this sampler to other sampling methods. This presentation summarizes the collected data to enable an overview about the different trials.

## Methods and Materials

The automatic continuous sampling device works in conformity to the EN1948-1:2005 (dilution method). The design enhances the minimum requirements defined in the standard to enable the long term application in industrial environment and the use of the same device in all different possible applications and sampling gas conditions.

### AUSTRIA (A)

The trial was done in a hazardous waste incineration plant against the EN1948-1:1996 (dilution method). The result was a good correlation, however, the manual sampling material did not allow to have long term measurements and the continuous sampling device (Versions G.16/1993 and G.17/1995) have not been optimized to do also short time samplings, so the processing had to be done by extrapolations.

### GERMANY

The comparison in this trial was done against the EN1948-1:1996 (filter-cooler method) in a municipal waste incinerator plant. The obtained data set includes good correlation within the used methods as well as within different sampling devices of the same construction.

### NETHERLANDS

The comparison in this trial was done against the EN1948-1:1996 (filter-cooler method) in a hazardous waste incineration plant. The trial included both, the long term application and the short term application. The results showed good conformity of changes and allowed to optimize the plant emissions.

### UK (MCERT)

The comparison in this trial was done against the EN1948-1:2005 (filter-cooler method) in two different plant types, a municipal waste incinerator and a cement kiln. The trial included both, the long term application and the short term application. The results showed good conformity of changes, but also, that the requirements of the standard have to be followed strictly also for the manual sampled material. The samples of the continuous working device are designed for long term application, thus the method is more robust against handling inconvenience.



### KOREA

The comparison in this trial was done against the Korean method in a municipal waste incineration plant and resulted in good correlation as well as in a successful type approval certificate.

[Annex form No.9]

Certificate No.	Type Approval Certificate for Environmental Measuring Equipment			
ASSD-2005-1				
① Company Name	Han O Tech. Co., Ltd.			
② Name of Representative	Sang Seob, Sim	① Resedent		② Resedent
④ Address	#307 Sehyun B/D, 790 Yoksam-Dong Kangnam-Ku, Seoul (Tel : 02-538-0216 )			
⑤ Company Address	#307 Sehyun B/D, 790 Yoksam-Dong Kangnam-Ku, Seoul (Tel : 02-538-0216 )			
Content of Approval	⑥ Manufacturer	MonitoringSystems GmbH	⑦ Country	Austria
	⑧ Equipment Description	Stack sampler with accessories	⑨ Type	G-19
	⑩ Product Name	DMS (DioxinMonitoringSystem)	⑪ Measuring Range	Flue gas velocity : 0 ~ 20m/s
	⑫ Minimum Scale(unit)	Monitor : 0.1 m3	⑬ Measuring Accuracy	6.86% (at isokinetic sampling with gas mixture rH :2%, velocity : 12m/s)
⑭ Condition of Approval	To observe the relevant Korean Law for Environmental Technology Development & Support, Article No.14			
We approve as above in accordance with Article no.14 of Law for environmental technology development & support and Article no.14-2 of corresponding enforcement regulation.				
April 20, 2005				
President of the National Institute of Environmental Research				

### FRANCE (A)

The comparison in this trial was done against the EN1948-1:2005 (cooled probe method) in two plants of the same type in two different regions. In both cases, the plant was a chemical waste incinerator using a rotary kiln and a basic flue gas cleaning system. In the first trial, the results have been influenced by an instable process together with non-conforming sampling time windows. Analyzing the results of this trial, the second trial was organized more strictly resulting in good correlating results of both methods.

### AUSTRIA (B)

The trial was done in a municipal waste incineration plant against the EN1948-1:2005 (dilution method). The result was a good correlation, however, the statistical sample does not allow detailed data processing.

### FRANCE (B)

This trials are defined to check the different installations for possible influence of the static sampling point locations against the larger number of sampling points of the EN 1948-1. This comparison was done in 8 incineration lines and resulted in good correlation, independent from the stack size and plant type.

### US (ETV)

This trial compared the device against the US EPA Method 23 / 23A. The experience of former trials, especially of the need of exact correlation in the sampling windows, was helpful in this trial and lead to good correlation results. The need of a statistical review to match the detection limits of both methods was found to be an additional need for the comparison.



## Results and Discussion

The various comparison trials of the automatic continuous sampling device DioxinMonitoringSystem resulted in general in a good correlation, independent from the reference method, from the plant type and the location. However, a detailed prepared and strictly organized sampling schedule, a balanced use of statistical methods and detailed analysis of the data are needed to obtain the results of expected quality.

The results of the most detailed test, the ETV of US EPA, are a relative accuracy of 17.5 %  
a relative standard deviation of 10.4 %  
(DioxinMonitoringSystemversus US EPA method)

## References

- Cowen, K. et al, Environmental verification testing report (2006)
- Lewandowski, M., Performance Standards and Test Procedures for Automatic Isokinetic Samplers (2005)
- Gemmill, R., M. Lewandowski, Technical guidance note for continuous isokinetic sampling of dioxins (2005)

## Device installation overview

by fuel type	
at municipal waste incinerators	35
at wooden material incinerators	4
at hazardous waste incinerators	7
at cement/brick kilns	2
at others	5
by oven type	
at rotary kilns	5
at fluidised bed kilns	10
at grate kilns	32
at static kilns	1
at cement/brick kilns	2
at others	3
by location	
in Austria	7
in Belgium	5
in France	19
in Germany	6
in Italy	6
in others	10

## Contacts

Please visit our exhibition booth for further information.

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